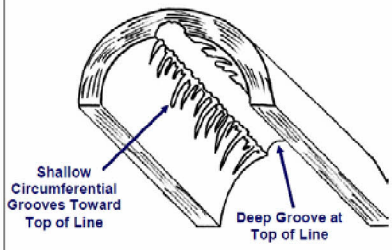
Richmond Refinery LPS Bulletin-Reliability Alky-Acid Line Leak (9/11/2011)

IMPACT ERM
Loss ID# 21570

Location:
Alky Plant
Cracking Division

Contact Information:
Ron Moore
510-242-3901
RNAM@chevron.com

Pinhole leak at bimetallic weld as a result of hydrogen grooving



Chevron Engineering Standards- Fig. 3500-11- Drawing of Hydrogen Grooving Corrosion of Carbon Steel

Tenets of Operations Violated:

1) #8- Address abnormal conditions
2) #9 – Always follow written procedures for high risk or unusual situations

Incident Description:

On September 11, 2011, during end of shift rounds, an Operator in the Alky plant discovered a pinhole leak on the fresh acid transfer line from the acid wash drum V-1440. The area was roped off and feed was pulled from the Alky plant so the line could be isolated for inspection and repairs. The leak was found on a bimetallic weld as a result of Hydrogen Grooving due to sulfuric acid at specific velocities. A temporary repair was made using a composite wrap and the unit was started back up on September12.

However, on Sept ember 23, the composite wrap failed and feed was pulled from the unit to stop the leak. The line was again repaired using a composite wrap and started back up on Sept ember 24, where the newly installed composite wrap leaked immediately upon startup. The unit was shutdown again and all composite wraps were completely removed from the piping. A new composite wrap was installed with plans to install an engineered composite wrap the following week. The unit was started up without incident on September 26 and the engineered wrap was installed on the line in early October with no additional leaks. The line was upgraded to Alloy 20 in January 2012 as a result of this incident.

Investigation Findings:

1) Inspection data for this line from 1995 to 2008 was suspected to be inaccurate or incomplete, thereby making it difficult to know the condition of this line. No x-ray records were retained from previous inspections to verify if hydrogen grooving had occurred in the past. Also, prior to 2005, inspection techniques that were used may not have discovered the hydrogen grooving.
2) Unusual inspection findings recorded from an on stream inspection in1999 showed significant corrosion for a 4 year period of operation (from 1995 to 1999) and no action was taken to follow up on those findings to confirm the results or make a recommendation for repairs.
3) The contractor installing the composite wrap approved of the shortening of the cure time for the composite wrap installation. The cure time is specified in contractors own procedures.

Lessons Learned:

1) Inspection x-ray results are now to be kept electronically and stored for future use if needed.

Recommendations:

1) Review this incident with inspection teams to reinforce the current practice of verifying abnormal inspection results and documenting the outcome.
2) Verify that the inspection techniques for the particular area are adequate for finding potential corrosion mechanisms such as hydrogen grooving. Note: Hydrogen grooving occurs only on the top section of the pipe and is generally very difficult to find without performing grid UT inspection on the piping.
3) Advise contractors performing work in the refinery that they are required to provide QA/QC documents for all work , including composite wraps, and implement a procedure so that the contractors can accomplish this directive.
4) Reinforce the directive that contractors are to perform work in the refinery in accordance with their own written procedures, and if they want to deviate from those procedures, then they must first receive appropriate approval from their superiors to deviate from such written procedures.